Name: _____   Date: _____
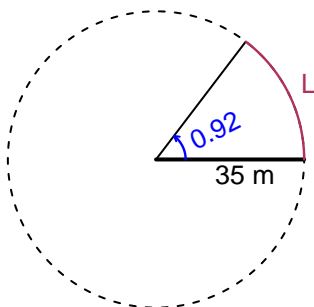
Trig Final (SLTN v649)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 0.92 radians. The radius is 35 meters. How long is the arc in meters?
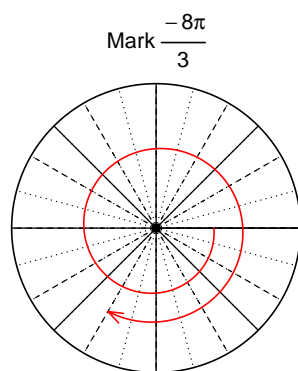

$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$
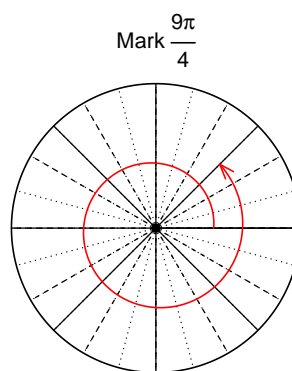
$L = 32.2$ meters.

Question 2

Consider angles $\frac{-8\pi}{3}$ and $\frac{9\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{-8\pi}{3}\right)$ and $\cos\left(\frac{9\pi}{4}\right)$ by using a unit circle (provided separately).

Mark $\dfrac{-8\pi}{3}$

Find $\sin(-8\pi/3)$

Mark $\dfrac{9\pi}{4}$
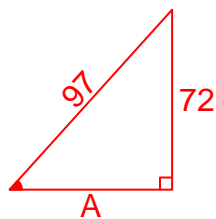

Find $\cos(9\pi/4)$

$\sin(-8\pi/3) = \frac{-\sqrt{3}}{2}$

$\cos(9\pi/4) = \frac{\sqrt{2}}{2}$

1

Question 3

If $\sin(\theta) = \frac{-72}{97}$, and θ is in quadrant IV, determine an exact value for $\tan(\theta)$.
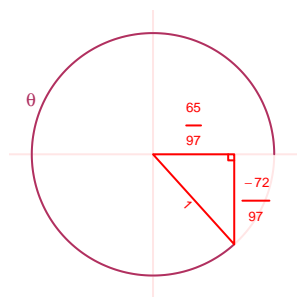
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.

Solve the Pythagorean Equation

$$A^2 + 72^2 = 97^2$$
$$A = \sqrt{97^2 - 72^2}$$
$$A = 65$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.

$$\tan(\theta) = \frac{\frac{-72}{97}}{\frac{65}{97}} = \frac{-72}{65}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 3.77 Hz, an amplitude of 8.78 meters, and a midline at $y = 5.82$ meters. At $t = 0$, the mass is at the maximum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 8.78\cos(2\pi 3.77t) + 5.82$$

or

$$y = 8.78\cos(7.54\pi t) + 5.82$$

or

$$y = 8.78\cos(23.69t) + 5.82$$